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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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CONNOLLY BOVE LODGE & HUTZ LLP
SUITE 800
1990 M STREET NW
WASHINGTON, DC 20036-3425

EXAMINER

MULLER, BRYAN R

ART UNIT	PAPER NUMBER
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3723

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/645,493

Applicant(s)

RONAY, MARIA

Examiner

Bryan R Muller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 1-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-36 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 8/22/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 17-19, 21-23, 28, 33 and 36 rejected under 35 U.S.C. 102(b) as being anticipated by Molnar (6,283,829).
2. In reference to claim 17, Molnar discloses a method of finishing semiconductor wafers comprising providing a liquid polishing slurry comprising abrasive particles to the surface to be planarized (col. 28, line 67 – col. 29, line 1) and contacting said surface with a polishing pad that consists essentially of a polymeric matrix (matrix is defined as: A situation or surrounding substance within which something else originates, develops, or is contained¹ and the polymer making up the polishing pad [col. 15, line 64] contains the solid lubricant particles, thus making it a matrix) and solid lubricant particles (col. 29, lines 12-23) in an amount sufficient to reduce friction between the pad and surface during planarizing (lubricant is defined as an agent that reduces friction between moving surfaces in col. 5, lines 15-16). Molnar discloses several embodiments of the CMP process and teaches that it is advantageous to provide lubricant and abrasive particles separately to improve finishing control (col. 29, lines 8-11). Molnar discloses that a preferred type of lubricant

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is one that can be included in the finishing element (polishing pad) such as a solid lubricant (col. 29, lines 12-23). In view of the disclosure, it is inherent that the abrasive would be provided in a polishing slurry when the solid lubricant is included in the polishing pad because it is preferred to supply the lubricant and abrasive separately.

3. In reference to claim 18, Molnar discloses the method discussed supra and further discloses that a preferred lubricating agent may be a fluorocarbon resin selected from a group comprising PTFE, PFA, or FEP (col. 29, lines 48-66).

4. In reference to claim 19, Molnar discloses that the solid lubricant may be PTFE, but does not disclose a range for the coefficient of friction for the material. Extrinsic evidence is provided at web address www.plastomertech.com/properties.asp that the coefficient of friction of PTFE is 0.04, thus within the range claimed in claim 19.

5. In reference to claims 21 and 22, Molnar discloses the method, as discussed supra, and that the solid lubricant may be PTFE, but fails to disclose that the size solid lubricant particles is about 0.05 to about 18 microns or further that the size solid lubricant particles is about 0.05 to about 0.5 microns but extrinsic evidence is provided by Yamada (6,312,759) that the mean particle size of Polytetrafluoroethylene (PTFE) is 0.5 μm (microns) (col. 29, lines 19-20).

6. In reference to claim 23, Molnar discloses that ultra high molecular weight polyethylene (UHMWPE) is a preferred ingredient (col. 25, lines 39-43) but does not disclose the actual molecular weight of such materials. Extrinsic evidence is provided in U.S. Patent number 5,411,351 (Lasch) that UHMWPE has a molecular weight of at least 500,000 (col. 4, lines 31-33), thus within the range claimed in claim 23.

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7. In reference to claim 28, Molnar discloses the method discussed supra and further discloses that the polymeric matrix is preferably made from an organic synthetic polymeric material selected from a group comprising polyurethanes, polyesters, polyamides and polyvinylchloride (col. 16, lines 5-11).

8. In reference to claim 33, Molnar discloses the method discussed supra and further discloses that the surface to be polished may be a wafer comprising copper aluminum and tungsten (col. 22, lines 17-20) or a low dielectric polymer (col. 22, line 54). In reference to claim 36, Molnar discloses the method discussed supra and further discloses that the planarizing may be chemical mechanical polishing (CMP) (col. 1, line 12).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,283,829) in view of Nishida (5,714,700).

11. Molnar discloses the method discussed supra but fails to disclose that the solid lubricant particles have a spherical, cylindrical or platelet shape. Nishida discloses a self-lubricating material wherein the solid lubricant particles are spherical or of platelet form, thus, teaching that solid lubricant particles may be spherical or of platelet form.

Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the solid lubricant particles of Molnar may be spherical, cylindrical or platelet shaped because these shapes are commonly known in the art as shapes for solid lubricant particles, as taught by Nishida.

12. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,283,829) in view of Horie (4,555,250).

13. Molnar discloses the method discussed supra and teaches that one preferred work piece may be a glass television faceplate but fails to disclose that the amount of solid lubricant is about 0.5 to 30% by weight, or further disclose that the amount of solid lubricant is about 0.5 to 10% by weight, or even further disclose that the amount of solid lubricant is about 2 to 3% by weight. Horie discloses a grinding (grinding is essentially the same as polishing, polishing is on a finer level than grinding) apparatus for precision grinding of glass objects that uses a solid lubricant in a preferred amount between 1 and 5% by weight. Therefore it would be obvious to one of ordinary skill in the art at the time the invention was made to provide the solid lubricant to the invention of Molnar in the amount of 1 to 5% by weight as a preferred amount to provide precision grinding/polishing to the work piece. This range of lubricant to be provided further limits the claimed ranges in claims 24 and 25 and overlaps the range claimed in claim 26, therefore making the range disclosed by Horie a relevant prior art rejection (see MPEP 2131.03 [R-2]).

14. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,283,829) in view of Murata (6,194,357).

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15. Molnar discloses the method discussed supra but fails to disclose that the solid lubricant particles are treated with a surfactant in an amount sufficient to disperse the lubricant in a planarizing slurry upon being detached from the pad during planarization. Murata teaches that surfactant may be used in waterborne lubricant (CMP slurry is commonly known to comprise water to one of ordinary skill in the art) in order to disperse a solid lubricant in the water to homogeneity (col. 6, lines 33-38). Therefore it would be obvious to one of ordinary skill in the art at the time the invention was made to treat the solid lubricant disclosed by Molnar with a surfactant in order to produce a homogeneous slurry when the solid lubricant particles become detached from the pad during planarization. A homogeneous slurry would be advantageous because it would provide uniform polishing across the entire surface of the substrate and prevent scratching due to built up particles.

16. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,283,829) in view of Bajaj (6,045,435).

17. Molnar discloses the method discussed supra but fails to disclose that the polymeric matrix that makes up the polishing pad is micro porous. Bajaj discloses a CMP process and teaches that it is common to use polishing pads in the CMP process and that polyurethane pads typically comprise micro-porous urethane (col. 8, lines 8-13). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to use a polishing pad comprising a micro-porous urethane (such as polyurethane disclosed by Molnar) because it was commonly known in the art to use micro-porous polishing pads in the CMP process, as taught by Bajaj.

18. Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,283,829) in view of Cook (5,489,233)

19. In reference to claim 30, Molnar discloses the method discussed supra but fails to disclose that the polymeric matrix that makes up the polishing pad is non-porous. Cook discloses a polishing pad comprising a solid uniform polymer sheet having no intrinsic ability to absorb slurry particles (abstract, lines 1-4) and teaches that prior art pads with composite structure (pores) are quite complicated to manufacture relative to manufacture processes for solid homogeneous material (col. 3, lines 7-11). One definition of the word "solid" is: Having no gaps or breaks; continuous;², thus defining the polishing pad of Cook as non-porous. Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to make the polymeric matrix non-porous minimize the difficulty of producing a porous polishing pad.

20. In reference to claim 31, Molnar discloses the method discussed supra but fails to disclose that the polishing pad surface contains macroscopic channels before use and microscopic texture during use to facilitate slurry transportation. Cook discloses a polishing pad that has macrot textures which act as channels for the unimpeded flow of slurry (col. 4, lines 39-42) and micro textures that also act as channels for the unimpeded flow of slurry (col. 5, lines 24-27), thus the polishing pad would have both macroscopic and microscopic channels before and during use. Cook further teaches that the unique combination of macroscopic and microscopic flow channels, present

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simultaneously, allows complete, unimpeded and uniform slurry flow to every portion of the pad surface (col. 5, lines 31-34). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to form macroscopic and microscopic flow channels in the surface of the polishing pad to allow complete, unimpeded and uniform slurry flow to every portion of the pad surface making the polishing more efficient at producing a uniform polished surface across the entire surface of the substrate.

21. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,283,829) in view of Chiddick (6,136,757).

22. Molnar discloses the method discussed supra but fails to disclose that the lubricant particles comprise a binding agent, coupling agent or adhesive promoter. Chiddick provides a solid lubricant and teaches that the addition of a binding agent is capable of binding a solid lubricants to metallic surfaces (such as the substrate) by dispersing the solid lubricant or holding the solid lubricant in a discontinuous phase matrix and that the binding agent has rigidity such that when the composition is placed on the metal surface, it has some structure and will maintain its integrity (col. 4, lines 54-64) after being exposed to forces from other objects (such as polishing pad). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to provide the solid lubricant with a binding agent to assist with dispersing the lubricant across the surface of the substrate to provide a uniform polished surface and to maintain the integrity of the lubricant during use to extent the life of the lubricant

composition, thus minimizing the amount of lubricant needed and overall operating cost of the polishing apparatus.

23. Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,283,829) in view of Molnar (6,390,890).

24. In reference to claim 34, Molnar ('829) discloses the method discussed supra but fails to disclose that a surface to be polished contains a low-k porous dielectric, low-k non-porous dielectric, air bridges or a combination of any of these materials. Molnar ('890) discloses a CMP process comprising abrasive and solid lubricant particles and teaches that finishing aids such as lubricants are preferred for finishing semiconductor wafers (disclosed as preferred work pieces by Molnar '829) having low-k dielectric layer and that one example of these low-k dielectric materials is low-k porous dielectric material. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the polishing pad of Molnar ('829) would be inherently capable of polishing a low-k porous dielectric wafer and would even be a preferred polishing pad due to the inclusion of a solid lubricant, as taught by Molnar ('890).

25. In reference to claim 35, Molnar ('890) further discloses that organic polymers and doped oxides are other examples of low-k dielectric materials so it would further be obvious that the polishing pad of Molnar ('829) would be preferred to polish an organic polymer or doped oxides, as discussed supra. Although Molnar does not disclose that the doped oxides are CVD or that the organic polymers are of the spin on type, this portion of claim 35 appears to be product by process claims. Therefore, the doped

oxides and organic polymers, as disclosed by Molnar ('890) in used with the Molnar ('829) disclosure provide relevant prior art for a rejection because doped oxides and organic polymers would react in the same way no matter what process was used to produce them.

Response to Arguments

26. Applicant's arguments, see "Applicants Remarks", filed 2/22/2005, with respect to the rejection(s) of claim(s) 17-36 under Molnar ('890) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Molnar ('829).

27. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

28. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the

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references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, in relation to claims 24-26, Horie discloses the a preferred amount of lubricant in a glass grinding solution, it is commonly known in the art that polishing is merely a finer process of grinding and Molnar ('829) discloses that the polishing process may be used to polish a glass television faceplate, providing relevance between the two prior art references because both process disclose glass as a work piece and finally Horie teaches that his process allows for precision grinding, thus motivation to use the same amount of lubricant in both processes to provide precise polishing for the Molnar ('829) process.

29. In response to applicant's argument that Chiddick ('757) is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, in relation to claim 32, although the disclosure of Chiddick does not relate to polymeric compositions, the advantages to providing a binding agent to solid lubricant particles that Chiddick does disclose would also be advantageous in the Molnar ('829) invention.

Conclusion

30. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

31. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

32. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Eppert (Pub US 2002/0002027 A1) provides polishing pads with micro and macroscopic channels, Robinson (6,325,702) provides a non-porous polishing pad with slurry distribution channels, Tanaka (6,305,847) teaches of solid lubricant with spherical shaped particles, Ingerly (6,717,265) teaches of treatment of low-k materials with CMP processing, Hsu (6,656,018) provides a polishing pad comprising a polymeric matrix made of polyurethanes, polyacrylates, polyamides or polycarbonates, Ramanath (6,019,668) discloses a grinding wheel comprising a

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polymeric matrix and includes a solid lubricant and Karum (Pub US 2002/0025426 A1) teaches the use of a surfactant with solid lubricants to produce uniform compositions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bryan R Muller whose telephone number is (571) 272-4489. The examiner can normally be reached on Monday thru Thursday and second Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph J Hail III can be reached on (571) 272-4485. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BRM

4/18/2005



Joseph J. Hail, III
Supervisory Patent Examiner
Technology Center 3700